MATH 1210 Assignment 4 Fall 2012

1. State whether each of the following matrices is in row echelon form. If a matrix is not in row echelon form, use elementary row operations to change it to row echelon form. Use the notation of the notes to indicate the elementary row operations used.

(a) $\begin{pmatrix} 1 & 3 & -2 \\ 0 & 1 & 4 \\ 0 & 0 & 2 \end{pmatrix}$
(b) $\begin{pmatrix} 2 & 1 & 3 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 2 & 1 & 4 \end{pmatrix}$
(c) $\begin{pmatrix} 1 & 0 & 2 \\ 0 & 4 & 3 \\ 0 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$

2. State whether each of the following matrices is in reduced row echelon form. If a matrix is not in reduced row echelon form, use elementary row operations to change it to reduced row echelon form. Use the notation of the notes to indicate the elementary row operations used.

(a) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 0 & 0 & 5 & 1 \\ 0 & 0 & 2 & 2 \\ 0 & 0 & 0 & 3 \end{pmatrix}$
(b) $\begin{pmatrix} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & 4 \\ 0 & 0 & 1 & 3 \end{pmatrix}$
(c) $\begin{pmatrix} 2 & 0 & 1 & -6 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 3 & 3 \end{pmatrix}$

3. Use Gaussian elimination to find all solutions of the system of equations

$$3x + 2y + z = 4,$$
$$2x - y + 4z = 8.$$

4. Use Gauss-Jordan elimination to find all solutions of the system of equations

$$x + y - z + 2w = 1,$$
$$3x - 2y + 2z - w = 0,$$
$$4x + y - 2z + 2w = 2,$$
$$-2x - 2y + 3z + w = -1.$$

5. Use Cramer's rule to find the value of z that satisfies the equations

$$x + 2y - 3z = 4,$$
$$2x - y + 3z = -6,$$
$$3x + 3y - 3z = 4.$$

6. Find the value of k so that 33 is the value of the determinant

$$\begin{vmatrix} 3 & 2 & -1 & 4 \\ 2 & k & 6 & 5 \\ -3 & 2 & 1 & 0 \\ 6 & 4 & 2 & 3 \end{vmatrix}.$$

7. (a) For what value(s) of the constant a will the equations

$$ax + y + 2z = 0,$$
$$4x + ay - 3z = 0,$$
$$2x + y + az = 0,$$

have nontrivial solutions.
(b) Find all solutions corresponding to the integer value for a.